

DDT FOR CONTROL OF HOUSEHOLD INSECTS AFFECTING HEALTH



FEDERAL SECURITY AGENCY

U. S. PUBLIC HEALTH SERVICE

MALARIA CONTROL IN WAR AREAS

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This preliminary leaflet is issued in a limited quantity for the use of public health officers and others concerned in the use of DDT to control household insects affecting health. In the near future a pamphlet on household use of DDT will be jointly issued by the Bureau of Entomology of the Department of Agriculture and the Public Health Service, Federal Security Agency, and will be available for distribution to the general public.

DDT ---

FOR CONTROL OF HOUSEHOLD INSECTS AFFECTING HEALTH

As a result of the recent widespread publicity given DDT as the miracle insecticide of the war, a flood of popular, semipopular, and technical articles about the uses of DDT for controlling household pests has appeared. Its extensive use by the military forces in combating malaria-carrying mosquitoes, flies, and other pests is known to almost everyone. With the announcement that DDT is available for general use, many people are anxious to try the new insecticide in public eating and drinking places, in institutions, and in the home.

The general release of DDT has created a demand for practical information as to how the average person can use this new insecticide. Our aim is to answer some of the questions asked most commonly about DDT and to give the latest available information about its most efficient use in connection with insects of public health significance.

Knowledge of the practical use of DDT is still far from complete. Its use in this country is as recent as November 1942. Although large amounts have been used at home and overseas, DDT was restricted and used only for specific purposes by trained personnel under careful supervision. Results of this usage indicate that DDT can be used safely and effectively by the average person for certain purposes and under certain conditions.

DDT is not a cure-all! IT DOES NOT KILL ALL KINDS OF INSECTS! Its action against certain insects is slower than that of some of the more common insecticides already in use. For instance, it has little effect on chiggers; its value against certain other insects is not fully confirmed. However, it has a specific toxic effect on certain kinds of insects. The chief advantage of DDT is its effectiveness against a majority of insects, and its residual or lasting effect when applied properly.

WHAT IS DDT?

The technical grade chemical is a harmless-looking, white, practically odorless powder resembling flour . . . especially flour with lumps in it—as the particles of pure DDT have a tendency to stick or clump together. DDT'S chemical name is dichloro-diphenyl-trichloro-ethane . . . but for convenience we use the first letter of each part of the name and call it DDT.

Since it does not dissolve in water, pure DDT cannot be used as a spray in water solutions. It is soluble in oils such as kerosene, in xylene, and various other organic solvents. As a matter of convenience, DDT is often dissolved in oil for spraying purposes.

WHAT IS A RESIDUAL SPRAY?

DDT acts both as a contact and stomach poison. Its most unusual property is its lasting or residual effect. When DDT is sprayed or dusted on walls, ceilings, floors, and other surfaces, it leaves a deposit or residue

of tiny crystals. If insects such as flies, mosquitoes, cockroaches, fleas, bedbugs, and certain other insects walk over or rest on this deposit long enough to obtain a sufficient exposure, they will be killed. The use of DDT as a coating or residue is quite different from that of ordinary fly sprays.

HOW DOES DDT RESIDUE KILL INSECTS?

Just how DDT kills is not fully understood at present. Evidently it is absorbed through the insects' feet as they walk over a spray deposit or DDT residue. After a short period of exposure, the affected insects become restless, drag their legs, and move about in a jerky and spasmodic manner. They may turn over on their backs and be unable to right themselves. They may develop tremors, the so-called DDT's or "double delirium tremens," and die . . . although death may not take place until hours later.

Mosquitoes and flies often move toward the light when they are first affected. After they receive a toxic dose of DDT, they may fly away and die elsewhere. So don't be disappointed at not finding a large number of dead insects after you've treated your house. The best test of DDT's effectiveness is the absence of live insects, not the presence of dead ones. However, flies, mosquitoes, and other insects may reinfest the premises from outside sources. If this happens, live insects may be seen before they have received a toxic dose, thus giving the erroneous idea that the spray is ineffective. Every effort should

be made to prevent this reinfestation from other sources, even though residual sprays are used.

IN WHAT FORMS IS DDT AVAILABLE?

DDT has been released for use by the public in a great variety of forms. These preparations contain DDT in varying amounts. The labels should be read carefully to be certain that the material contains a sufficient amount of DDT to be effective.

OIL SOLUTIONS FOR RESIDUAL SPRAYS

Solutions of DDT in highly refined, deodorized, white kerosene, or in some other commercial solvents regularly used in ordinary fly sprays, are available. Most of these sprays contain 5 percent DDT. *Oil solutions should contain 5 percent DDT to be effective as a residual spray in a wide variety of uses.* Preparations on which labels fail to state the definite concentration of DDT should not be purchased.

Weaker solutions containing 1 to 2 percent or less DDT to fortify "fly sprays" are not satisfactory as residual sprays. Users of these weaker dilutions will be disappointed by their ineffectiveness as residual sprays. Since the solvent is important only as a carrier, the purchaser should remember that he is buying DDT and not the carrier, when he purchases a residual spray. Weak solutions require such large amounts of spray that it is impractical to try to get enough on a wall for an effective residue.

If the manufacturer's label indicates that a DDT isomer or byproduct is the active ingredient, an 8- to 10-percent solution is needed for satisfactory results. The various byproducts are not standardized and, in general, are less effective than the technical grade DDT.

Oil solutions containing 5 percent DDT can be used as sprays against specific household pests. Since some of the solvents used may be inflammable, proper precautions should be taken against the danger of fire.

DO NOT USE ORDINARY KEROSENE IN MAKING HOUSEHOLD SPRAYS . . . USE ONLY WHITE KEROSENE.

DDT IN FLY SPRAYS

Many manufacturers of well known "fly sprays" are adding small amounts of DDT, $\frac{1}{2}$ to 1 percent, to their commercial sprays, which also contain other toxicants. This addition insures a greater percentage of kill. However, such weak solutions used as "space sprays," which create a poisonous mist in the air, are not suitable for application of DDT residues.

BE SURE TO DISTINGUISH BETWEEN "SPACE SPRAYS" AND DDT—RESIDUAL SPRAY!

DUSTS

A number of dry mixtures of DDT are available for dusting. These contain 5 to 10 percent DDT diluted with some powder, such as talc or pyrophyllite, which serves as a carrier. The usual dilution is 1 part of DDT

in 9 parts of carrier. For most uses other than agricultural, *the dust should contain 10 percent DDT.*

SUSPENSIONS

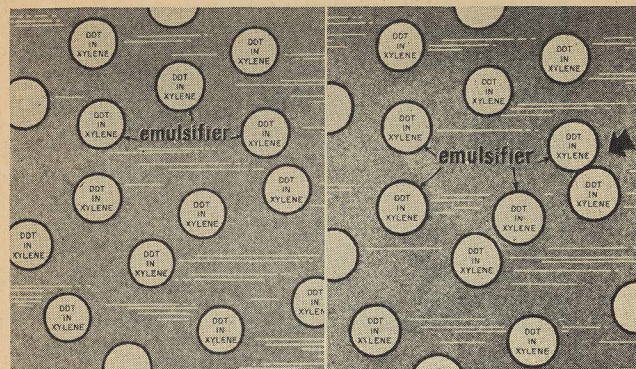
A DDT powder containing a chemical which permits the DDT particles to be mixed readily with water may also be used as a residual spray. In this mixture, called a suspension, small particles of DDT are distributed evenly throughout the liquid.

A *5-percent DDT spray* is prepared from such a DDT powder by diluting it with water. The amount of water necessary depends upon the concentration of DDT in the commercial product. The manufacturer's label should supply this information.

The DDT suspension can be sprayed on surfaces. It has no odor, presents no fire hazard, and is harmless when applied to the skin of man or to the coats of animals. When the water evaporates, small flecks of both DDT and the carrier remain on the sprayed surface. The spray shows as a white spotting on dark surfaces such as dark-stained furniture, dark-colored paints, varnished floors, and window glass. However, it is very effective and easy to apply where spotting is unimportant.

EMULSIONS

Although DDT is not soluble in water, it dissolves easily in some organic solvents. Concentrations of 25 to 40 percent can be prepared by using these solvents. They may be diluted with water by using a chemical which

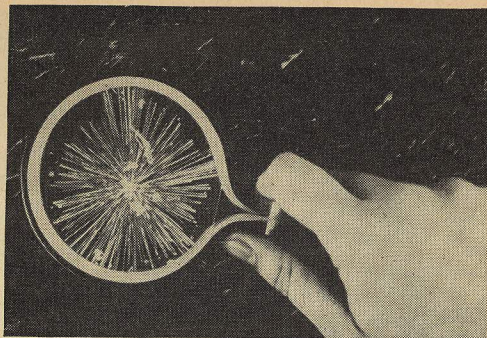


DDT-Xylene + Water + Emulsion = Stable Emulsion

permits the concentrate to be mixed with water. A chemical used for this purpose is called an emulsifier, and the resulting mixture is an emulsion.

Xylene is commonly employed as a solvent for DDT, and when an emulsifier is added the material may be mixed with water so that the DDT-xylene solution breaks up into fine droplets. These are dispersed throughout the water giving it a milky appearance. The resulting mixture is a stable emulsion.

Stock emulsion concentrates containing 20 to 35 percent DDT dissolved in some organic solvent such as xylene, together with an emulsifier to insure ready mixing with water, may also be procured commercially. The proper dilution with water depends on the concentration of DDT in the stock emulsion. By following the directions on the manufacturer's label, a 5 percent residual spray may be prepared.



Highly Magnified DDT Residue Crystals

One gallon of a 35-percent xylene-emulsion concentrate of DDT consists of 3 pounds technical grade DDT powder, 3 quarts xylene, and 6 fluid ounces of an emulsifying agent. Preparation of the emulsion concentrate from pure DDT powder requires materials which may not be readily available to individuals. Also special care is necessary to insure the solution of such concentrated amounts of DDT. Therefore its preparation by inexperienced individuals is not advised.

PAINTS

Whitewash paints and oil-base paints containing DDT are being produced. However, since little is known about them, the manufacturer's directions should be followed. No recommendations as to their effectiveness can be made at this time.

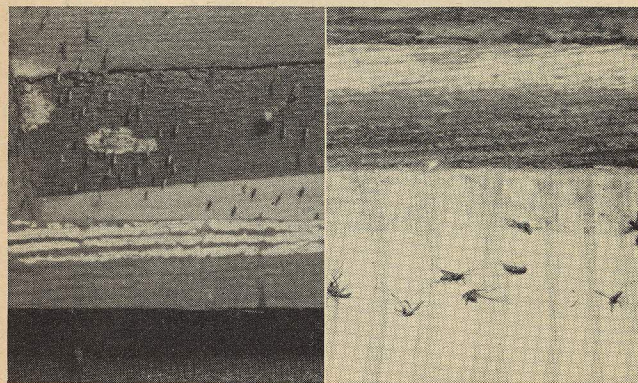
PURE DDT (TECHNICAL GRADE)

An undiluted, technical grade DDT may also be available . . . but the preparation of dusts and emulsion concentrates by the householder for his own use is not recommended. Pure DDT is difficult to mix with a dry powder unless the two are ground together with special equipment.

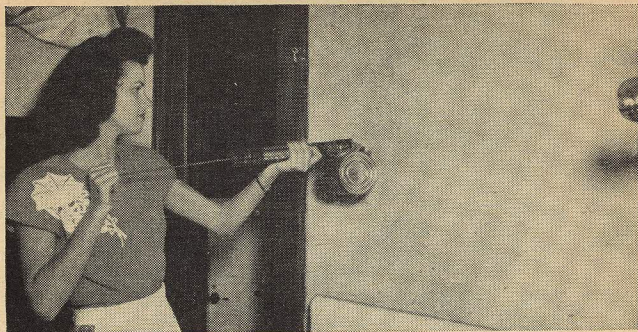
HOW ARE DDT RESIDUAL SPRAYS APPLIED?

The use of DDT as a residual spray is an entirely new approach to household pest control. It should not be used in the same way that ordinary fly sprays are used. The aim of residual spraying is to coat the treated surface with a very fine layer of the insecticide to give a lasting effect in killing insect pests.

To do this, the liquid must be painted on or applied as a coarse, wet spray so that as much DDT as possible



Mosquitoes on a Wall . . . Killed by DDT



Applying DDT Residue with Hand Sprayer

will remain on the treated surface and not blow away in a mist. For best results, the surface should be wet as much as possible without letting the spray liquid run

down the walls. This requires about 2½ quarts of 5-percent DDT spray for the average sized room.

The ordinary household sprayers now in common use can be used for applying DDT, although pumping a hand sprayer is tiresome when more than a single room is treated at a time. It is also difficult to



Air-Pressure Sprayer in Use



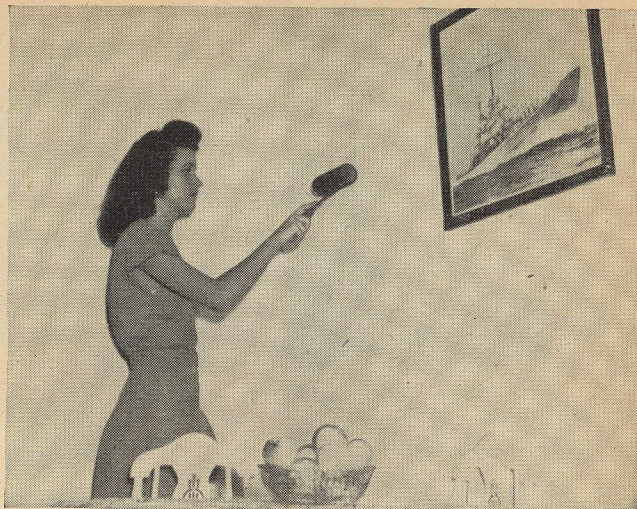
Vacuum Cleaner with Spray Attachment

apply an even coat of DDT with these small plunger-type hand sprayers.

Larger 2½- to 4-gallon air-pressure garden-type hand sprayers can be used when more than one room or larger areas are to be treated. The small, size 3, open-



Painting Screens with DDT Solution



Roller Application of DDT Residue

ing plate in the nozzle is used for delivering the proper amount of spray.

Some vacuum cleaners have a spray attachment which can be used to apply DDT solutions to walls, rugs, furniture, and other places where a residual deposit is desired.

For applying DDT to screens, shelves, electric light cords, or other special surfaces, a wide paint brush should be used to insure an adequate, even coating. Spraying screens wastes DDT, because much of it passes through the mesh. However, a heavy coat should be applied to screens as some insects prefer them for resting surfaces. This coat may be effective for periods ranging from 3 weeks to 2 months or more. DDT loses its toxicity more

readily from exposed screens than from inside protected surfaces. Avoid spotting window glass when treating screens.

A special pad of felt or other material used in applying screen paints, can be used instead of a brush or sprayer for applying DDT solution to screens.

DO NOT PERMIT DDT OIL SOLUTIONS OR EMULSIONS TO REMAIN IN SPRAYERS. THIS RESULTS IN RUSTED SPRAY TANKS, DECOMPOSED GASKETS AND HOSE, CLOGGED NOZZLES.

For applying DDT in dust form, the ordinary small hand dust gun can be used to force the DDT into narrow crevices or to distribute it generally over a surface. A coarse salt shaker is useful in distributing small quantities of the dust and in treating dogs for fleas and



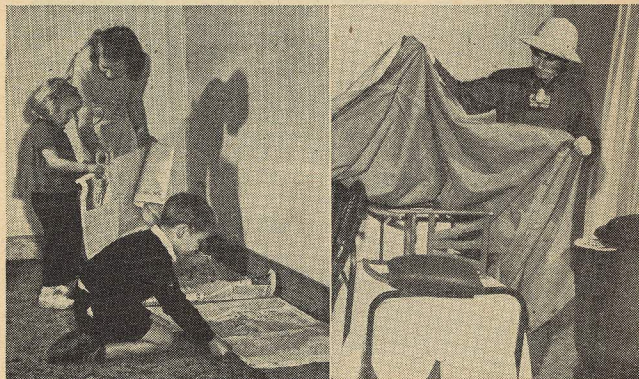
DDT Dust Residues

ticks. DDT dusts may contain an added material such as pyrethrum for a quick knock down—otherwise a considerable length of time may elapse before the insects are killed.

HINTS ON SPRAYING DDT

In wetting surfaces with DDT spray, it is important to guard against spotting. Varnished floors or dark linoleum may be protected by newspapers. Dark-stained furniture should be covered. Shades may be pulled down to avoid spotting the window glass. Even in treating kitchens, some of the spray may drift into adjoining rooms and spot the floors and furniture. Such spotting can be removed from furniture, varnished floors, and dark baseboards with furniture polish applied liberally, then wiped with a clean, dry cloth.

Be sure to wipe light wall surfaces with a clean, dry



Cover Varnished Floors and Furniture

rag to remove dust before spraying. Otherwise, droplets of spray will collect particles of dust and leave a dirt-spotted wall.

If wall cleaning or painting is contemplated, be sure to do it before DDT is applied. Don't apply DDT to freshly painted surfaces—its period of effectiveness will be greatly shortened.

Some wall surfaces may spot—especially certain shades of blue or green wallpaper. Most light wallpapers, however, will not show the deposit after it has dried. Calcimined surfaces should not be sprayed . . . the spray may cause the calcimine to run.

If there is any question about applying DDT to papered or painted surfaces, treat a small test area in an inconspicuous place and allow it to dry thoroughly to see the result.

Don't touch a sprayed surface while it is still wet. Streaking will result, and this shows when the spray dries. If a surplus of the spray results in white spotting, wait until sprayed surface dries before rubbing it with a clean white cloth to remove the streaks.

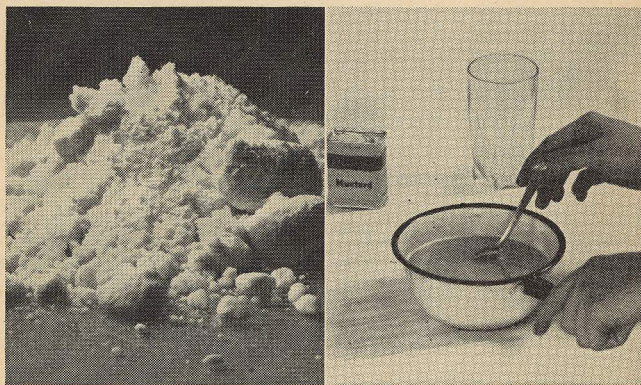
HOW LONG WILL DDT RESIDUES LAST?

Under experimental conditions, DDT has very long-lasting residual properties . . . months for killing flies and mosquitoes under special conditions. But the duration of effectiveness under actual conditions is a different matter. It varies with different types of surfaces, with the dosage used, and with various other conditions.

In general use, one cup of 5-percent *spray* is sufficient to treat effectively each 60 square feet of surface against flies and mosquitoes for about 3 months. When applied to newly painted surfaces, the effect is lost rapidly. Dust and grease deposits covering treated surfaces reduce the length of effectiveness. Vibrations cause a flaking-off of the DDT deposit, and shorten the period of residual effect.

WHAT PRECAUTIONS SHOULD BE TAKEN WHEN USING DDT?

Although DDT is deadly to many insects, it is not harmful to man when used as recommended. It is definitely less toxic to man than paris green and sodium fluoride, which have long been used as common insecticides. However, as with any insecticide, the user must take certain precautions to avoid any possible harmful effects to him.



If DDT is Swallowed, Drink Mustard Water

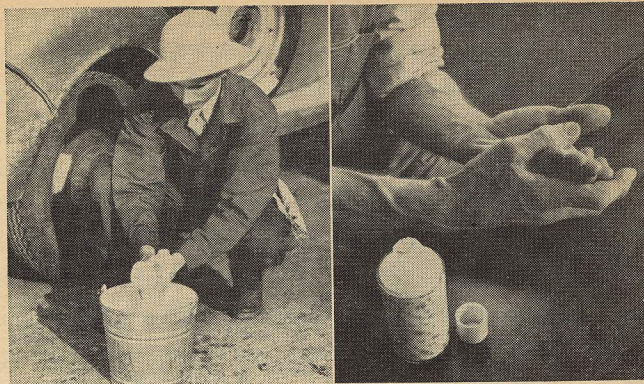
In spite of its toxicity, harmful effects have not been observed in animals exposed in rooms which contained many times the recommended insecticidal concentration of DDT in sprays or dusts. But careless use and exposure to abnormally high concentrations of DDT may cause toxic effects. Therefore, it is essential to follow carefully the directions for its use as a household insecticide.

Food contaminated with DDT from ordinary home use will probably cause no toxic effects in man. Such contamination should be avoided, however, by removing food from the room or by covering it during the spraying.

If DDT is swallowed accidentally, drink some MUSTARD WATER immediately. This is made by adding one tablespoonful of mustard to a glass of warm water. Mustard water causes vomiting which empties the stomach. Call or see a physician at once!

DDT in *dust form* is not absorbed through the skin unless grease, oil, or greasy skin lotion is also present on the skin. Nevertheless, DDT powders should not be allowed to remain on the skin. Avoid excessive inhalation of the powder. Since the diluted dust, especially if it is not colored, may be mistaken for flour or other foodstuffs, carefully label DDT and take every precaution to keep it away from children. Avoid food contamination.

DDT in *oil solution* is readily absorbed through the skin. Therefore, DDT oil solutions should not be allowed to remain on the skin or to saturate clothing. If some does get on the skin, wash the hands and exposed



In Large-Scale Spraying Operations—(1) Wash Hands Frequently and Use a Greaseless Skin Lotion

skin with warm, soapy water. If oil solutions or concentrates are spilled on the clothes, change them promptly. Avoid inhaling the mist and contaminating food with the spray. *Never use a DDT oil solution on the skin or on coats of animals.*



(2) Wear Goggles, a Respirator, and Rubber Gloves

DO NOT SPRAY DDT OIL SOLUTIONS NEAR OPEN FIRES.

It should be pointed out that many of the solvents used in preparing DDT sprays may irritate the skin and cause other harmful results when handled carelessly. By observing proper precautions and cleanliness, these can be avoided.

If a great deal of spraying is to be done, it is advisable to wear gloves, goggles, and a respirator to avoid excessive contact and inhaling of DDT and its solvents.

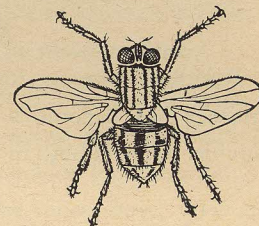
HOW CAN DDT BE USED AGAINST SPECIFIC PESTS?

FLIES

The use of DDT as a residual spray is our most effective way of controlling flies in buildings. By applying a coating of *5-percent DDT spray*, a residue is left which will be effective for a period of 3 months or longer under average conditions.

A small hand sprayer, a larger air-pressure garden sprayer, or a wide paint brush are suitable for treating the walls and ceilings of rooms where food is prepared or served. Under ordinary circumstances, it is unnecessary to treat all the rooms.

The principal resting places of flies should be covered with the spray residue. At night they prefer to rest on ceilings, around cracks and crevices, along edges of ceilings, doorways, and furniture. Electric and switch



Housefly

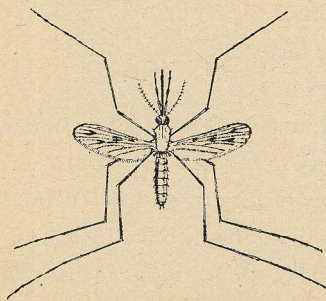
cords should be painted or sprayed with DDT solution. When flies cling to them, they receive a toxic dose of DDT. In some places, fly control can be accomplished merely by spraying these special places without treating the entire room. If strips of bandage, heavy string, or cord are soaked in DDT solution and hung in the room they may serve the same purpose.

Spraying garbage cans and adjacent surfaces will help reduce the fly population. Treating the back porch and steps and the area around the kitchen door will be effective too.

KEEP FOOD AND WATER CONTAINERS COVERED AFTER SPRAYING THE ROOM. FLIES FALL INTO THEM AS DDT TAKES EFFECT.

MOSQUITOES

Residual spraying for the control of anopheline mosquitoes has become a routine procedure in the fight against malaria both in this country and with our military



Malaria Mosquito

forces overseas. In houses sprayed with DDT, mosquitoes infected with malaria parasites have ample opportunity to rest on a treated surface and be killed before they have a chance to spread the disease. This is the basic



Spray Dark Corners and Ceilings for Mosquito Control

principle of malaria control through residual spraying.¹

The same type of residual spraying is also effective against other types of mosquitoes which enter houses.

In applying a residual spray for mosquitoes, all wall surfaces and ceilings should be treated . . . especially dark corners, portions of walls behind pictures and furniture, and other undisturbed places where mosquitoes rest during the day. The undersurfaces of tables, backs of bookcases and beds, underparts of chairs and tables, closets, porches, and screens should also be treated.

¹ See the "Handbook of DDT Residual Spray Operations," Malaria Control in War Areas, USPHS, Atlanta, Ga., March 1945.

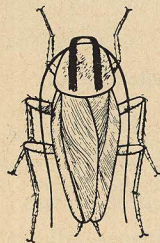
The methods of application already discussed on pages 9 through 15 can be followed in applying DDT residues for mosquito control.

Most mosquitoes which enter houses do so at night or in the early morning. Some live mosquitoes may be seen as late as 10 a. m. But by this time, the majority will have been exposed to a treated surface and killed. Such treatment is effective for 3 months or longer if DDT is applied properly.

VENTILATE ROOMS WHEN SPRAYING WITH DDT SOLUTIONS.

COCKROACHES

DDT is effective for control of cockroaches, if applied carefully; it is less poisonous to human beings and pets than the sodium fluoride used in most roach powders. Using a small hand dust gun, force *10-percent DDT* powder in cracks and crevices where roaches hide. Apply *5-percent DDT* spray to the undersides of tables, shelves, sinks, and to vertical surfaces where roach infestation is common.



German Cockroach

Roaches hit by the spray should die almost immediately.

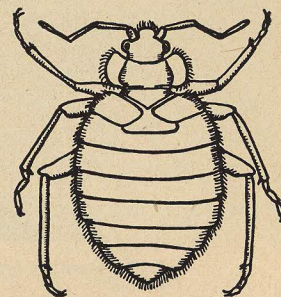
A combination of dusting and spraying is most effective for cockroach control. The period of time required for complete control will depend upon extent of the infestation and thoroughness of application.

DO NOT ALLOW DDT TO FALL ON DISHES, FOOD, OR COOKING UTENSILS.

BEDBUGS

DDT is an effective weapon against bedbugs and is far superior to the pyrethrum sprays formerly used in controlling these pests. When a *5-percent DDT spray* is properly applied to mattresses and bedsteads, a single treatment will "bugproof" them for 6 months or longer.

A small hand sprayer can be used to force the DDT solution into each crack and joint of the bed and into the springs. Spray all surfaces—top, bottom, and sides—until they have a misty-wet appearance. Be sure to get the spray into the seams and folds where the bedbugs hide. About $\frac{1}{2}$ cup of *5-percent spray* should be sufficient for each bed.



Bedbug

In heavy infestations, spray the walls around the bed, cracks along the baseboards, surfaces behind loose wallpaper, and other small spaces in the bedrooms where the bugs may hide during the day.

DDT is somewhat slow in its action against bedbugs, so don't expect a complete kill until 48 hours after the bugs have been exposed to the deposit.

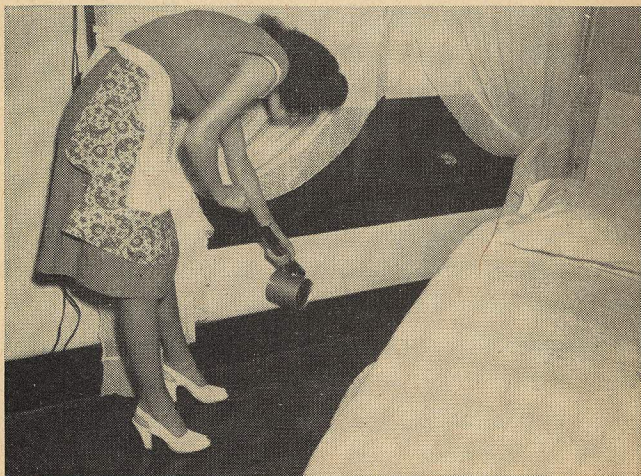
WARNING - - - DON'T USE OIL SPRAYS NEAR FIRE!

FLEAS

In most instances, flea infestation in houses can be traced to household pets . . . usually a dog or cat. Occasionally, rat fleas are the culprits. The latter are



Treating Mattress for Bedbugs

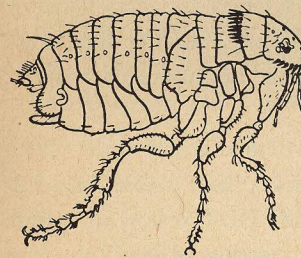


Spraying Baseboard for Bedbug Control

dangerous because they can transmit typhus from rat to man. DDT powder, dusted along rat runways and into burrows and nesting areas, is being utilized on typhus control projects.

The sleeping places of pets are most heavily infested, but if pets have the run of the house, all rooms, especially the basement, may become infested.

Dust the infested rooms thoroughly with *10-percent DDT powder* and pay special attention to sleeping places of the pets or to places where they are accustomed to lie down. The powder can be dusted into cracks and crevices, in basements, and in other places where fleas



Dog Flea

may breed. The excess powder can be wiped up with a cloth or removed with a vacuum cleaner. If left in place, the treatment may control fleas as long as 80 days after dusting. Flea-infested yards and leaves can be treated with the powder.

If a board floor is dusted, the powder can be left in place for a day or two and then swept up. By sweeping across the boards, much of the DDT is forced into the cracks and will remain between the boards where flea larvae live.

If powder is undesirable, a *5-percent DDT spray* either in a highly refined kerosene solution or in an emulsion may be applied to floors, rugs, furniture, and in places

where pets sleep. About 1 quart of 5-percent DDT spray covers 250 square feet of surface. If a kerosene-base spray is used, take precautions to avoid danger from fire.

Most dogs of average size may be dusted safely with about a tablespoon of 10-percent DDT powder. Often a line of dust along the middle of the back is sufficient to kill all the fleas and to prevent reinfestation for a week or more. DDT dust activates fleas before causing their death. The rapid crawling and biting of the fleas cause the dog to scratch and bite vigorously until the fleas are paralyzed.

CATS SHOULD NOT BE TREATED WITH DDT DUSTS, because they lick themselves and may swallow enough DDT to make them sick. Treating the house and the cat's bed will probably be sufficient without having to treat the cat itself.

Many commercial flea powders contain some pyrethrum, rotenone, or other quick-killing poison in addition to DDT. When used alone, DDT is slow in action.

DDT dissolved in oil may be absorbed directly through the skin of animals with fatal results. Kerosene and other oils are poisonous to the skin. Several instances are already on record of valuable animals being killed as a result of their being sprayed with or dipped in DDT oil solutions.

NEVER USE DDT OIL SOLUTIONS ON ANIMALS!

LICE

DDT first made a name for itself in the control of lice during the typhus epidemic that threatened Naples

during the early days of the Italian campaign. DDT is effectively used against all species of human-infesting lice and is easily applied, but a knowledge of the different species of lice is essential for effective use of DDT.

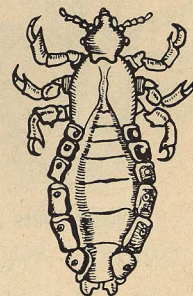
As a result of their work in developing a louse powder for the Armed Forces, the following recommendations have been made by the Division of Insects Affecting Man and Animals, Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

BODY LICE

Since body lice are usually found in clothing and not on the body itself, *clothing* should be treated . . . especially the underwear where lice are most likely to be found.

Sift 10-percent DDT powder over the entire inner surface of the underwear and take special care to rub it into the seams. The inside of shirts, trousers, hats, and other articles of clothing should be treated at the same time. About 1 ounce, 2 heaping tablespoonfuls, of the powder per treatment will remain effective for periods of 3 weeks or longer if the clothing is not washed. Clothing treated in this way will kill lice even after being washed once in warm soapy water.

Great care should be taken to avoid reinfestation from discarded clothing or bath towels. Bedding can also be treated by dusting between sheets.



Body Louse

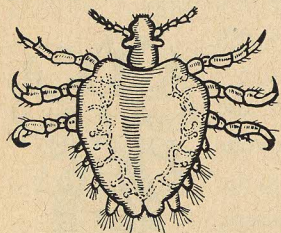
HEAD LICE

A *10-percent DDT dust* is effective against head lice. A teaspoonful of *10-percent dust* should be rubbed thoroughly into the hair. Since DDT does not kill the eggs or nits, a second treatment should be made 8 to 10 days later.

Liquid solutions of DDT for head lice are also available, but the manufacturer's directions should be followed carefully.

CRAB LICE

Crab lice infestations can be controlled easily by dusting the affected parts lightly with a *10-percent DDT dust*. The pubic region and armpits are most commonly infested. In a very hairy person the entire body should be dusted lightly.



Crab Louse

A second application should follow 8 to 10 days after the first to kill any young lice which may have hatched during this time.

OTHER HOUSEHOLD PESTS

Other household pests such as brown dog ticks, ants, silverfish, clothes moths, and carpet beetles may be controlled by DDT . . . it is recommended that inquiries concerning general control of household insects be directed to the Department of Agriculture, Bureau of Entomology and Plant Quarantine, Washington 25, D. C.

DO NOT SUBSTITUTE DDT FOR GOOD SANITATION AND CLEANLINESS.

IN APPLYING 5-PERCENT DDT RESIDUAL SPRAY

| | |
|---------------------|-----------------|
| 1 cup will treat | 60 square feet |
| 1 pint will treat | 120 square feet |
| 1 quart will treat | 240 square feet |
| 1 gallon will treat | 960 square feet |

WHEN THE SPRAY LIQUID EVAPORATES, A RESIDUE OF ABOUT 200 MILLIGRAMS OF DDT PER SQUARE FOOT WILL REMAIN.

THIS SHOULD BE EFFECTIVE IN KILLING INSECTS FOR THREE MONTHS OR LONGER.

